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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/739,618	12/18/2000	John H. Howard	5181-59100	3682

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EXAMINER
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DUONG, THOMAS

ART UNIT	PAPER NUMBER
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2145

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/21/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b> 09/739,618	<b>Applicant(s)</b> HOWARD, JOHN H.	
	<b>Examiner</b> Thomas Duong	<b>Art Unit</b> 2145	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 16 October 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 2-10, 12-20, 22-27, and 29-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2-10, 12-20, 22-27, and 29-35 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>1/7/04</u> | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Response to Amendment*

1. This office action is in response to the applicants Amendment filed on October 16, 2006. Applicant canceled *claims 40-44*. *Claims 2-10, 12-20, 22-27, and 29-35* are presented for further consideration and examination.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. *Claims 2-3, 8, 12-15, 18, 22-23, 29-32, and 35* are rejected under 35 U.S.C. 102(b) as being anticipated by Kozakura (US005724581).
4. With regard to *claims 2, 8, 12, 22, and 29*, Kozakura discloses,
  - *a non-volatile memory storing a first inode locating a first file in said storage and also storing a journal comprising a list of committed inodes; and* (Kozakura, col.1, lines 40-50; col.2, lines 48-58, lines 18-26; col.3, lines 29-54; col.4, line 41 – col.5, line 41; col.6, line 58 – col.7, line 15; col.20, lines 23-34; col.20, line 48 – col.21, line 42)

Kozakura discloses, *"a current page table 2 is provided in the main storage unit and manages the position information in the data base storage unit concerning the latest physical page storing the latest updated data and the shadow physical page storing the data before the latest update"* (Kozakura, col.4, lines 41-45) and *"a current table management table 3 is provided in the main storage unit and manages as a shadow page table the current page table whose backup data are copied when a checkpoint is recorded, and manages the current page table updated after the checkpoint as the latest page table"* (Kozakura, col.4, lines 46-51). Hence, Kozakura teaches of the current and shadow page tables (i.e., Applicant's inodes) storing the position information of the physical data base data. In addition, Kozakura discloses, *"the present invention comprises a current page table for storing a page table in which a shadow page system manages a physical page corresponding to each logical page in a data base, and a current page table management table for managing the page table in the current page table using the shadow page system"* (Kozakura, col.3, lines 34-39). Hence, Kozakura teaches of the current page table management table (i.e., Applicant's journal) for managing the page tables (i.e., Applicant's inodes). Furthermore, Kozakura discloses, *"a non-volatile semiconductor memory such as a flash memory, a RAM disk, etc. can be used as the secondary storage unit 40"* (Kozakura, col.20, lines 28-30). Hence, Kozakura teaches of using non-volatile memory to store the current and shadow page tables (i.e., Applicant's inodes), which, in turn, stores the position information of the physical data base data.

- *a block manager configured to copy said first inode to a second inode, wherein said block manager is configured to change said second inode in response to*

*updates to said first file, and wherein said block manager is configured to atomically update said first file in response to a commit of said first file by writing said second inode to said non-volatile memory, whereby said second inode locates said first file in said storage, and wherein said block manager is configured to record said second inode in said journal. (Kozakura, col.1, lines 40-50; col.2, lines 48-58, lines 18-26; col.3, lines 29-54; col.4, line 41 – col.5, line 41; col.6, line 58 – col.7, line 15; col.20, lines 23-34; col.20, line 48 – col.21, line 42)*

*Kozakura discloses the first updating unit 7 “[obtaining] a currently unused physical page, [copying] data in the latest page table to the physical page, and enters the copied data in the management table 3 as the latest page table for the logical page. The copied-from latest page table is entered in the current page table management table 3 as a shadow page table. Then, the newly-obtained physical page is set in the blank page management unit 6 as a physical page being used” (Kozakura, col.5, lines 6-13), in response to “when data on a logical page are updated as a result of an execution of a transaction” (Kozakura, col.4, lines 66-67). In addition, Kozakura discloses, “a second updating unit 8 [referring] to the current page table 2 which has been updated by the first updating unit 7, and writes the updated data on the logical page to the latest physical page corresponding to the logical page whose data are stored in the current page table 2 and should be updated. Then, it changes the position information pointing to the shadow page corresponding to the logical page in the current page table such that the information indicated the latest physical page” (Kozakura, col.5, lines 24-32). Hence, Kozakura teaches of a “current page table for managing position information about [the] latest physical page storing latest*

*updated data and a shadow physical page storing the data before [the] latest update"* (Kozakura, col.20, lines 54-57), a current page table management table for pointing to the latest page table as well as the shadow page table, and updating the table accordingly in response to execution of a transaction.

5. With regard to claims 3, 18, 23, and 35, Kozakura discloses,

- *wherein said commit of said first file comprises a commit command received from an external source which updates said first file.* (Kozakura, col.1, lines 40-50; col.2, lines 48-58, lines 18-26; col.3, lines 29-54; col.4, line 41 – col.5, line 41; col.6, line 58 – col.7, line 15; col.20, lines 23-34; col.20, line 48 – col.21, line 42)

6. With regard to claims 13 and 30, Kozakura discloses,

- *further comprising writing a master inode corresponding to an inode file including said second inode to a checkpoint record in said journal.* (Kozakura, col.1, lines 40-50; col.2, lines 48-58, lines 18-26; col.3, lines 29-54; col.4, line 41 – col.5, line 41; col.6, line 58 – col.7, line 15; col.20, lines 23-34; col.20, line 48 – col.21, line 42)

7. With regard to claims 14-15 and 31-32, Kozakura discloses,

- *wherein recovering from a system failure comprises:*
  - *scanning said journal to locate a most recent checkpoint record and zero or more inodes subsequent to said most recent checkpoint record within said journal;* (Kozakura, col.1, lines 40-50; col.2, lines 48-58, lines 18-26; col.3,

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lines 29-54; col.4, line 41 – col.5, line 41; col.6, line 58 – col.7, line 15; col.20, lines 23-34; col.20, line 48 – col.21, line 42)

- *copying said master inode from said most recent checkpoint record to a volatile memory; and* (Kozakura, col.1, lines 40-50; col.2, lines 48-58, lines 18-26; col.3, lines 29-54; col.4, line 41 – col.5, line 41; col.6, line 58 – col.7, line 15; col.20, lines 23-34; col.20, line 48 – col.21, line 42)
- *updating an inode file corresponding to said master inode with said one or more inodes subsequent to said most recent checkpoint record.* (Kozakura, col.1, lines 40-50; col.2, lines 48-58, lines 18-26; col.3, lines 29-54; col.4, line 41 – col.5, line 41; col.6, line 58 – col.7, line 15; col.20, lines 23-34; col.20, line 48 – col.21, line 42)
- *wherein said updating said inode file comprises:*
  - *copying one or more blocks of said inode file storing said one or more inodes to a copied one or more blocks; and* (Kozakura, col.1, lines 40-50; col.2, lines 48-58, lines 18-26; col.3, lines 29-54; col.4, line 41 – col.5, line 41; col.6, line 58 – col.7, line 15; col.20, lines 23-34; col.20, line 48 – col.21, line 42)
  - *updating said master inode in said volatile memory to point to said copied one or more blocks.* (Kozakura, col.1, lines 40-50; col.2, lines 48-58, lines 18-26; col.3, lines 29-54; col.4, line 41 – col.5, line 41; col.6, line 58 – col.7, line 15; col.20, lines 23-34; col.20, line 48 – col.21, line 42)

### ***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 4-5, 9-10, 19-20, and 24-25 are rejected under 35 U.S.C. 103(a) as being obvious over Kozakura (US005724581) and in view of Fuller (US005870757A).

10. With regard to claims 4-5, 9-10, 19-20, and 24-25, Kozakura discloses,

See *claims 3, 8, 18, and 23* rejection as detailed above.

However, Kozakura does not explicitly disclose,

- *wherein said commit command comprises a file close command.*
- *wherein said commit command comprises an fsync command.*

Fuller teaches,

- *wherein said commit command comprises a file close command.* (Fuller, col.1, line 51 – col.3, line 48; col.22, line 35 – col.23, line 23)

*Fuller discloses of available transactional commands such as: 'close', 'fsync', 'read', 'write', 'commit', etc. that can cause the execution of a transaction.*

- *wherein said commit command comprises an fsync command.* (Fuller, col.1, line 51 – col.3, line 48; col.22, line 35 – col.23, line 23)
- *Fuller discloses of available transactional commands such as: 'close', 'fsync', 'read', 'write', 'commit', etc. that can cause the execution of a transaction.*

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine the teachings of Fuller with the teachings of Kozakura to provide a “*single transaction technique for journaling file systems ... [that overcome] the performance degradation which may be experienced in*



*conventional journaling file systems by entering each file system operation into the current active transaction” (Fuller, col.1, lines 51-55). In addition, Fuller anticipates, “in addition to increasing overall file system performance under even light computer system operational loads, even greater performance enhancement is experienced under relatively heavy load” (Fuller, col.1, lines 59-62).*

11. Claims 6-7, 16-17, 26-27, and 33-34 are rejected under 35 U.S.C. 103(a) as being obvious over Kozakura (US005724581) and in view of Zheng et al. (US006571259B1).

12. With regard to claims 6-7 and 26-27, Kozakura discloses,

See *claims 2 and 22* rejection as detailed above.

However, Kozakura does not explicitly disclose,

- *wherein said journal further includes a checkpoint record including a description of an inode file, a block allocation bitmap, and an inode allocation bitmap.*
- *wherein the description comprises inodes for each of said inode file, said block allocation bitmap, and said inode allocation bitmap.*

Zheng teaches,

- *wherein said journal further includes a checkpoint record including a description of an inode file, a block allocation bitmap, and an inode allocation bitmap.*

(Zheng, col.3, line 3 - col.4, line 14; col.13, line 66 – col.15, line 47)

- *wherein the description comprises inodes for each of said inode file, said block allocation bitmap, and said inode allocation bitmap. (Zheng, col.3, line 3 - col.4, line 14; col.13, line 66 – col.15, line 47)*

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine the teachings of Zheng with the teachings of Kozakura to provide an alternate method of *"[recovering] from a system failure by restoring the database to its consistent state existing just after commitment of the last completed transaction ... [by maintaining] a log file of the database changes and the commit commands ... [including] a sufficient amount of information (such as 'before' and 'after' images) in order to undo the changes made to the database since the last commit command"* (Zheng, col. 1, line 67 - col.2, line 8). In addition, according to Kozakura, *"the log of a transaction is stored in a log file in the secondary storage unit at the completion of the transaction. If a system failure occurs, the data base restores its state before the failure based on the page table management table and the page table stored as backup data in the secondary storage unit, and the log file"* (Kozakura, col.3, lines 44-49).

13. With regard to claims 16-17 and 33-34, Kozakura and Zheng disclose,

- *wherein said block map further comprises a first inode allocation bitmap indicating which inodes within said first inode file are allocated to files, the method further comprising:*
  - *copying said first inode allocation bitmap to a second inode allocation bitmap;*  
(Kozakura, col.1, lines 40-50; col.2, lines 48-58, lines 18-26; col.3, lines 29-54; col.4, line 41 – col.5, line 41; col.6, line 58 – col.7, line 15; col.20, lines 23-34; col.20, line 48 – col.21, line 42; Zheng, col.3, line 3 - col.4, line 14; col.13, line 66 – col.15, line 47)

- *modifying said second inode allocation bitmap to reflect one or more inodes allocated to new files; and* (Kozakura, col.1, lines 40-50; col.2, lines 48-58, lines 18-26; col.3, lines 29-54; col.4, line 41 – col.5, line 41; col.6, line 58 – col.7, line 15; col.20, lines 23-34; col.20, line 48 – col.21, line 42; Zheng, col.3, line 3 - col.4, line 14; col.13, line 66 – col.15, line 47)
- *establishing a third inode within said block map to said second inode allocation bitmap subsequent to said modifying said second inode bitmap.*  
(Kozakura, col.1, lines 40-50; col.2, lines 48-58, lines 18-26; col.3, lines 29-54; col.4, line 41 – col.5, line 41; col.6, line 58 – col.7, line 15; col.20, lines 23-34; col.20, line 48 – col.21, line 42; Zheng, col.3, line 3 - col.4, line 14; col.13, line 66 – col.15, line 47)
- *wherein said block map further comprises a first block allocation bitmap indicating which blocks within a storage including said block map are allocated to files, the method further comprising:*
  - *copying said first block allocation bitmap to a second block allocation bitmap;*  
(Kozakura, col.1, lines 40-50; col.2, lines 48-58, lines 18-26; col.3, lines 29-54; col.4, line 41 – col.5, line 41; col.6, line 58 – col.7, line 15; col.20, lines 23-34; col.20, line 48 – col.21, line 42; Zheng, col.3, line 3 - col.4, line 14; col.13, line 66 – col.15, line 47)
  - *modifying said second block allocation bitmap to reflect one or more blocks allocated to files; and* (Kozakura, col.1, lines 40-50; col.2, lines 48-58, lines 18-26; col.3, lines 29-54; col.4, line 41 – col.5, line 41; col.6, line 58 – col.7, line 15; col.20, lines 23-34; col.20, line 48 – col.21, line 42; Zheng, col.3, line 3 - col.4, line 14; col.13, line 66 – col.15, line 47)

- *establishing a fourth inode within said block map to said second block allocation bitmap subsequent to said modifying said second block allocation bitmap.* (Kozakura, col.1, lines 40-50; col.2, lines 48-58, lines 18-26; col.3, lines 29-54; col.4, line 41 – col.5, line 41; col.6, line 58 – col.7, line 15; col.20, lines 23-34; col.20, line 48 – col.21, line 42; Zheng, col.3, line 3 - col.4, line 14; col.13, line 66 – col.15, line 47)

### ***Response to Arguments***

14. Applicant's arguments with respect to *claims 2-10, 12-20, 22-27, and 29-35* have been considered but they are not persuasive.

15. With regard to *claims 2, 12, 22, and 29*, the Applicants point out that:

- *However, Kozakura's log file does not store a list of committed page tables. Accordingly, the log file cannot teach or suggest "a journal comprising a list of committed inodes". The page table data structures cannot be a journal, since these are updated as transactions progress and thus do not comprise a list of committed inodes.*

However, the Examiner finds that the Applicants' arguments are not persuasive because Kozakura discloses, *"the present invention comprises a current page table for storing a page table in which a shadow page system manages a physical page corresponding to each logical page in a data base, and a current page table management table for managing the page table in the current page table using the shadow page system"* (Kozakura, col.3, lines 34-39). Hence, Kozakura teaches of

the current page table management table (i.e., Applicant's journal) for managing the page tables (i.e., Applicant's inodes).

16. With regard to claims 2, 12, 22, and 29, the Applicants point out that:

- *The Office Action also refers to Kozakura's creation of checkpoints of page table data. However, these checkpoints are not related to a commit command. Rather, they are performed cyclically or at a given time (Kozakura, col. 2, lines 48-49), or when no transactions are in progress (Kozakura, col. 2, lines 59-61).*

However, the Examiner finds that the Applicants' arguments are not persuasive because Kozakura discloses the first updating unit 7 "[obtaining] a currently unused physical page, [copying] data in the latest page table to the physical page, and enters the copied data in the management table 3 as the latest page table for the logical page. The copied-from latest page table is entered in the current page table management table 3 as a shadow page table. Then, the newly-obtained physical page is set in the blank page management unit 6 as a physical page being used" (Kozakura, col.5, lines 6-13), in response to "when data on a logical page are updated as a result of an execution of a transaction" (Kozakura, col.4, lines 66-67).

### **Conclusion**

17. **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not

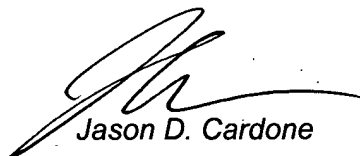
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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas Duong whose telephone number is 571/272-3911. The examiner can normally be reached on M-F 7:30AM - 4:00PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason D. Cardone can be reached on 571/272-3933. The fax phone numbers for the organization where this application or proceeding is assigned are 571/273-8300 for regular communications and 571/273-8300 for After Final communications.

*Thomas Duong (AU2145)*

*March 17, 2007*



*Jason D. Cardone*

*Supervisory PE (AU2145)*